

REMARKS

Claims 1-30 are pending in the application. Claims 1-30 have been examined and stand rejected. Claims 1, 12, 20 and 27-30 have been amended to more clearly define the invention. Reconsideration and allowance of the claims are respectfully requested.

THE CLAIMS

Rejection of Claims 1, 4, 5, 15, 16, 19, 20, 22 and 25 Under 35 U.S.C. §102(b)

Claims 1, 4, 5, 15, 16, 19, 20, 22 and 25 stand rejected under 35 U.S.C. §102(b) as being anticipated by Hosoi (U.S. Patent No. 5,754,665).

Hosoi Reference

Hosoi describes using two noise cancelers to allow for hands-free communication from either of the two microphones 2 and 3. When microphone 2 (placed at the driver's seat) is used for conversation, microphone 3 (placed at the passenger's seat) is used to collect noise, and adder 16 and FIR filter 14 operate as the noise canceller. [See column 2, lines 55-61.] Conversely, when microphone 3 is used for conversation, microphone 2 is used to collect noise, and adder 15 and FIR filter 13 operate as the noise canceller. Hosoi simply describes implementing the conventional noise canceller shown in FIG. 1 for each of the two microphones 2 and 3. The two noise cancellers in Hosoi are presumably operated all the time since there is no mechanism to disable one of the two noise cancellers.

Claim 1 of the Present Invention

Claim 1 of the present invention, as amended, recites:

“A mobile communication device comprising:

a plurality of signal detectors mounted on the mobile communication device, the plurality of signal detectors being placed in close proximity to one another and forming a small array, each signal detector configured to provide a respective detected signal having a desired component plus an undesired component; and

a noise suppression unit operatively coupled to the plurality of signal detectors and configured to receive and digitally process the plurality of detected signals from the

plurality of signal detectors to provide an output signal having substantially the desired component and a large portion of the undesired component removed.”

Support for the amendment to claim 1 is shown in FIGS. 1A through 1C and also in paragraph [152] where it is stated “the small form factor also results in the microphones being located relatively close to each other (i.e., a small array).”

Applicants submit that claim 1 is not anticipated by Hosoi for at least the following reasons.

First, Hosoi does not describe having the “plurality of signal detectors mounted on the mobile communication device.” Instead, the two microphones 2 and 3 in Hosoi are placed on the driver’s seat and the passenger’s seat and are thus removed from the speech apparatus that contains the two noise cancellers.

Second, Hosoi does not describe “the plurality of signal detectors being placed in close proximity to one another and forming a small array.” Instead, the two microphones 2 and 3 in Hosoi are placed relatively far from one another. This allows Hosoi to rely on one microphone to provide the desired signal and the other microphone to provide the noise. Claim 1 does not have this reliance and can isolate the desired signal and noise via digital signal processing (e.g., beam forming). This allows the mobile communication device of claim 1 to have a small form factor, which is highly desirable for a portable device.

For at least the above reasons, Applicants submit that claim 1 of the present invention is not anticipated by Hosoi. Claims 4, 5, 15, 16 and 19 are dependent on claim 1. These claims are not anticipated by Hosoi for at least the reasons noted above for base claim 1. These dependent claims may further recite additional features not described or suggested by Hosoi.

Independent claim 20 has been amended to recite features similar to that described above for claim 1. Applicants submit that claim 20 is also not anticipated by Hosoi for the reasons noted above for claim 1. Claims 22 and 25 are dependent on claim 20 and are not anticipated by Hosoi for at least the reasons noted above for claim 1.

Accordingly, the §102(b) rejection of claims 1, 4, 5, 15, 16, 19, 20, 22 and 25 should be withdrawn.

Rejection of Claims 1-3, 6-12, 20, 21 and 27-30 Under 35 U.S.C. §102(e)

Claims 1-3, 6-12, 20, 21 and 27-30 stand rejected under 35 U.S.C. §102(e) as being anticipated by Isaka *et al* (U.S. Patent Publication 2002/0138254).

Isaka Reference

Isaka describes a speech processing apparatus comprised of ... “a target source direction estimation section for estimating the direction of the target source...”. [See the abstract.] Isaka describes a prior art method for improving S/N ratio using an adaptive array of a small number of microphones. Isaka concludes, however, that with this method, it is difficult to improve the S/N ratio in an environment where the S/N ratio is low because there is so many noise sources that their directions cannot be identified. [See paragraph [0005]].

Applicants submit that claim 1 is not anticipated by Isaka for at least the following reason. Isaka appears to have teach away from “the plurality of signal detectors being placed in close proximity to one another and forming a small array,” as claim 1 recites. Isaka describes using (1) beam former 92 to suppress noise and extract the desired signal from the target source, (2) target source direction estimation section 93 for estimating the direction of the target source, and (3) beam former 91, set to the estimated target direction, to generate a signal containing noise. [See paragraph [0116]]. Presumably, an array of a small number of microphones would not work for this application.

Thus, Applicants submit that claim 1 of the present invention is not anticipated by Isaka. Claims 2-3 and 6-12 are dependent on claim 1 and are not anticipated by Isaka for at least the reasons noted above for base claim 1.

Independent claim 20 has been amended to recite features similar to that described above for claim 1. Applicants submit that independent claim 20 is also not anticipated by Isaka for the reason noted above for claim 1. Claim 21 is dependent on claim 20 and is not anticipated by Isaka for at least the reasons noted above for claim 1.

Independent claim 27 has also been amended to recite features similar to that described above for claim 1. Applicants submit that independent claim 27 is also not anticipated by Isaka for the reason noted above for claim 1. Claim 28-30 are dependent on claim 27 and are not anticipated by Isaka for at least the reason noted above for claim 1.

Accordingly, the §102(e) rejection of claims 1-3, 6-12, 20, 21 and 27-30 should be withdrawn.

Rejection of Claims 13, 14, 17 and 18 Under 35 U.S.C. §103(a)

Claims 13, 14, 17 and 18 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Isaka in view of Anderson *et al.* (U.S. Patent No. 6,453,285). The rejection states that Isaka does not disclose a voice activity detector (VAD). The rejection states that Anderson discloses this VAD.

Claims 13, 14, 17 and 18 are dependent on claim 1. Applicants submit that Isaka does not describe all of the limitations of base claim 1 for the reason noted above. Thus, Isaka is an insufficient basis for the §103(a) rejection of claims 13, 14, 17 and 18.

Furthermore, Isaka does not use a VAD and relies on a different mechanism, presumably the detection of the direction of the target source, to perform speech enhancement. Anderson uses a VAD but operates on a single audio input signal. [See FIG. 1 of Anderson.] There seem to be no motivation to apply the VAD of Anderson, which operates on a single audio input signal, to a speech processing system with multiple input signals from multiple signal detectors. Thus, Applicants submit that claims 13 and 14 of the present invention are patentable over Isaka in view of Anderson.

Accordingly, the §103(a) rejection of claims 13, 14, 17 and 18 should be withdrawn.

Rejection of Claim 26 Under 35 U.S.C. §103(a)

Claim 26 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Isaka in view of Saruwatari *et al.* The rejection states that Isaka does not disclose the microphones being placed close to each other and not in an end-fire type of configuration. The rejection indicates that Saruwatari describes this.

In paragraph [183] of the application, it is stated “also the microphones are not placed in an end-fire type of configuration, i.e., one in which the microphones are placed in front of one another along an axis that is pointed approximately toward the sound source.” Saruwatari assumes a straight-line array with the look direction being normal to the array, as shown in FIG. 1 of Saruwatari. Applicants thus submit that Saruwatari does not recite the additional feature of claim 26.

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Accordingly, the §103(a) rejection of claim 26 should be withdrawn.

CONCLUSION

Applicants believe all claims now pending in this application are in condition for allowance. The issuance of a formal Notice of Allowance at an early date is respectfully requested.

If the Examiner believes a telephone conference would expedite prosecution of this application, please telephone the undersigned at (650) 289-0600.

Respectfully submitted,



Truong T. Dinh
Reg. No. 40,993